FCX-AIIe SERIES

Differential Pressure (Flow) Transmitter

The FCX–AIIe differential pressure (flow) transmitter accurately measures differential pressure, liquid level, gauge pressure or flow rate and transmits a proportional 4 to 20 mA signal. The transmitter combines a unique silicon capacitance sensor with state-of-the-art microprocessor technology to provide exceptional performance and reliability.

Features

High Performance

Combine the proven variable capacitance measurement principle with a sensor machined from a single silicon wafer and the result is a performance specification traditionally reserved for the elite class transmitter. The standard accuracy of the FCX-AIIe ±0.1% and long term stability is ± 0.2% for three years.

Isolated Sensor

The "Advanced Floating Cell" serves to increase the mechanical integrity of the measuring cell by isolating the silicon sensor from adverse conditions present in normal process applications. This unique cell construction reduces total measurement error by minimizing the effects of varying process temperature, static pressure, and overpressure.

Communication Protocols

The FCX–AIIe communicates in both Fuji proprietary and HART(r) protocol. Any HART®compatible device can communicate with the FCX–AIIe.

Application Flexibility

Various features and options make the FCX–AIIe suitable for a wide variety of process applications:

- All 316 and 316L SST wetted parts
- 30:1 turndown for all ranges
- Analog indicator orients in either the vertical or horizontal plane.
- Full range of hazardous area approvals
- RFI filter and lightning arrester
- 5-digit LCD meter with support for engineering units

Output Linearization

In addition to selectable linear or square root outputs, the AIIe can also be programmed to linearize a differential pressure curve of up to 14 points. This programmable functionality renders the transmitter suitable to tank volume applications.

Burnout Flexibility

The AIIe's burnout signal is adjustable via the hand held communicator to either under scale (3.2 to 3.8 mA) over scale (20.8 to 21.6 mA) or output hold (last value) complying with NAMUR NE43.

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Specifications

FUNCTIONAL SPECIFICATIONS

Service

Liquid, gas, or vapor

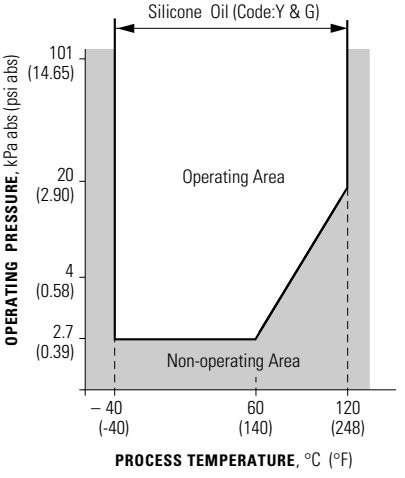
Span and range limit

DIFFERENTIAL PRESSURE

Range Code	Calibrated Span					
	Minimum			Maximum		
	in w.c. (psi)	kPa	mBar	in w.c. (psi)	kPa	mBar
33	4	1.06	10.6	125	32	320
34	17	4.33	43.3	520	130	1300
35	(2.5)	16.66	166.6	(72)	500	5000

Vacuum Limitation

Silicone fill sensor:
(see diagram)
Fluorinated fill sensor:
66kPa abs /
500mm Hg abs /
9.6 PSI abs
at 60°C max.



Static pressure and over range limit

16 MPa (2300 psig)

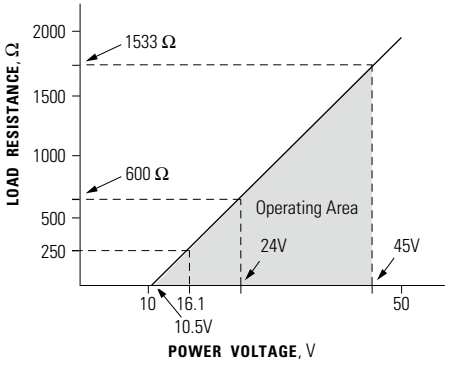
Output signal

4 to 20mA DC c/w
HART & Fuji Protocol

Power supply

Transmitter operates
on 10.5V to 45V DC at transmitter terminals.
10.5V to 32V DC for the units with optional arrester.

Load limitations: see figure below



Note: For communication with HHC (Model: FXW), minimum of 250 Ω resistance required.

Hazardous locations (some approvals pending)

Authorities	Flameproof	Intrinsic safety	Type N Nonincendive
ATEX	Ex II 2 G and D – EExd IIC T5/T6	Ex II 1 G and D – EExia IIC T4/T5	Ex II 3 G and D – EExn IIC T4/T5
Factory Mutual	Class I II III Div. 1 Groups B thru. G	Class I II III Div. 1 Groups A thru. F	Class I II III Div. 2 Groups A thru. G
CSA	Class I II III Div. 1 Groups C thru. G	Class I II III Div. 1 Groups A thru. G	Class I II III Div. 2 Groups A thru. G

Zero/span adjustment:

Adjustable via the HHC or external adjustment screw.

Damping:

Adjustable between 0 to 32 seconds via the HHC

Zero elevation/suppression:

–100% to +100% of URL. Zero plus span not to exceed URL.

Normal/reverse action

Selectable from HHC.

Burnout direction

Selectable from HHC

If self-diagnostic detects transmitter failure, the analog signal will be driven to either "Output Hold" (last value), "Output Overscale" (between 20.8mA to 21.6mA) or "Output Underscale" (between 3.2mA to 3.8mA).

Loop-check output

Any constant signal between 3.8mA and 21.6mA via HHC.

Temperature limit

Ambient: –40 to +85°C (–40 to +185°F)
–20 to +80°C (–4 to +176°F) for LCD indicator
–40 to +60°C (–40 to +140°F) for arrester option
–10 to +60°C (–14 to +140°F) for fluorinated oil filled transmitters
For explosion-proof units (flameproof or intrinsic safety), ambient temperature must be within the limits specified in each standard.

Process: –40 to +120°C (–40 to +248°F) for silicone fill sensor
–20 to +80°C (–4 to +176°F) for fluorinated oil fill sensor

Storage: – 40 to +90°C (–40 to +194°F)

Humidity limit

0 to 100% RH

Communication

Hart or Fuji proprietary protocol.

Programmable output linearization function:

Output signal can be characterized with a 14 point linear approximation function via the HHC.

PERFORMANCE SPECIFICATIONS

Reference conditions, silicone oil fill, 316SS isolating diaphragms, 4 to 20mA analog output in linear mode.

Accuracy rating: (including linearity, hysteresis, and repeatability)

For spans greater than 1/10 of URL: ±0.1% of span

For spans below 1/10 of URL:

$$\pm \left(0.05 + 0.05 \ \frac{0.1 \times \text{URL}}{\text{span}} \right) \% \text{ of span}$$

Stability:

± 0.2% of upper range limit (URL) for 3 years.

Temperature effect:

Effects per 28°C (82°F) change between the limits of – 40°C and 85°C (–40°F and 185°F)

Zero shift;

$$\pm \left(0.1 + 0.025 \ \frac{\text{URL}}{\text{span}} \right) \%$$

Total effect;

$$\pm \left(0.125 + 0.025 \ \frac{\text{URL}}{\text{span}} \right) \%$$

Static pressure effect:

Zero shift (% of URL) ±0.1%/10MPa / 100bar / 1500 psi
Span shift (% of calibration span) -0.2%/10MPa / 100bar / 1500 psi

Overrange effect

±0.3%/16MPa / 160bar / 2300 psi

Supply voltage effect

Less than 0.005% of calibrated span per 1V

RFI effect

Less than 0.2% of URL for the frequencies of 20 to 1000MHz and field strength of 30 V/m with electronics cover on.
(CE compliant with directive 89 / 339 / EEC electromagnetic compatibility)

Step response (without electrical damping)

Range code (6th digit in code symbols)	Time constant	Dead time
"3"	0.3 s	0.2 s
"5" and "6"	0.2 s	

Mounting position effect

Zero shift; less than 0.12 kPa / 1.2 mbar / 0.5" w.c. for a 10° tilt in any plane. Error can be corrected by adjusting zero.
No effect on span.

Dielectric strength:

500V AC, 50/60Hz 1 min., between circuit and earth.

Insulation resistance:

More than 100MΩ at 500V DC.

Turn-on time:

4 sec.

Internal resistance for external field indicator:

12Ω or less

Low flow cut-off:

In square root output mode, configurable between 0 to 20% of output.

PHYSICAL SPECIFICATIONS

Electrical connections:

G1/2, 1/2-14 NPT, Pg13.5, or M20 x 1.5 conduit, as specified.
Single conduit.

Process connections:

1/4-18 NPT or Rc1/4 on 54mm (2-1/8") centers, as specified.
Meets DIN 19213.

Process-wetted parts material:

Material code (7th digit in Code symbols)	Process cover	Diaphragm	Wetted sensor body	Vent/drain
V	316 stainless steel	316L stainless steel	316 stainless steel	316 stainless steel

Sensor O-rings: Viton O-ring or Teflon gasket.

Non-wetted parts material:

Electronics housing: Low copper die-cast aluminum alloy finished with epoxy/polyurethane double coating.
Bolts and nuts: Cr-Mo alloy (standard), 304 stainless steel or 630 stainless steel. Static pressure rating for 304 stainless steel bolts is 10 MPa (1450 psi).
Fill fluid: Silicone oil (standard) or fluorinated oil
Mounting bracket: 304 stainless steel

Environmental protection

IEC IP67

Mounting

On 60.5mm (2") pipe using mounting bracket, direct wall mounting, or direct process mounting.

Mass{weight}:

Transmitter approximately 4.4kg (9 lbs) without options.

OPTIONAL FEATURES

Indicator:

Analog indicator (1.5% accuracy).
Digital indicator (5 digit LCD).

Arrester:

Lightning surge immunity: 4kV (for 50μs duration)

Oxygen service:

Process wetted parts oil-free. The fill fluid is fluorinated oil.

Chlorine service:

The fill fluid is fluorinated oil.

Degreasing:

Process-wetted parts oil-free, standard fill fluid silicone oil. Not for use on oxygen or chlorine measurement.

NACE specification:

Metallic materials for all pressure boundary parts comply with NACE MR-01-75. ASTM B7M or L7M bolts and 2HM nuts (Class II) are available. Static pressure rating is 10 MPa (1450 psi).

Optional tag plate:

An extra stainless steel tag with customer tag data is attached to the transmitter.

Accessories

Flange adapters:

Converts process connection to 1/2-14 NPT in carbon steel or in 316 stainless steel.

Hand-held communicator:

Installed with Fuji Proprietary Protocol.

Code Symbols

DIGIT	DESCRIPTION	ORDER CODE	1	2	3	4	5	6	7	8	–	9	10	11	12	13	–	14	15	–	16
	Base Type	4-20 mA, Smart (w/digital signal)	**F**	**H**	**C**				**V**	**4**	–						–			–	
4	**Connections**	**Process** / **Conduit** / **Adapt Screw**																			
		Rc 1/4 / (1) G 1/2 / 7/16-20 UNF				A															
		1/4-18 NPT / (1) Pg 13.5 / M10 / M12				C															
		1/4-18 NPT / (1) M20 X 1.5 / M10 / M12				D															
		1/4-18 NPT / (1) Pg 13.5 / 7/16-20 UNF				E															
		1/4-18 NPT / (1) 1/2-14 NPT / 7/16-20 UNF				F	←														(NORTH AMERICAN STANDARD)
5, 6	**Ranges**	**Static Pressure (psi)** / **Span Limit (FHG)**																			
		–14 to + 2300 psi / 4 to 125"					3	3													
		–14 to + 2300 psi / 17 to 520"					3	5													
		–14 to + 2300 psi / 2.5 to 72 psi					3	6													
7	**Materials**	**Process Cover** / **Diaphragm** / **Wetted Cell Body**																			
		316 SST / 316L SST / 316 SST							V												
8	**Version**									4											
9	**Indicator and Arrester**	**Indicator** / **Arrester**																			
		None / None										A									
		Analog, 0 to 100% Linear Scale / None										B									
		Analog, 0 to 100% Square Root / None										C									
		Analog, Custom Scale / None										D									
		Analog, Double Scale / None										J									
		None / Yes										E									
		Analog, 0 to 100% Linear Scale / Yes										F									
		Analog, 0 to 100% Square Root / Yes										G									
		Analog, Custom Scale / Yes										H									
		Analog, Double Scale / Yes										K									
		Digital, 0 to 100% / None										L									
		Digital, Custom Scale / None										P									
		Digital, Square Root / None										M									
		Digital, 0 to 100% / Yes										Q									
		Digital, Custom Scale / Yes										S									
		Digital, Square Root / Yes										N									
10	**Approvals**	FM, Flameproof (or explosionproof)											D								
		CSA, Explosionproof, Intrinsically Safe and Non-Incendive											E								
		ATEX, Flameproof											X								
		FM, Intrinsically Safe and Non-Incendive											H								
		ATEX, Intrinsically Safe											K								
		ATEX, Type N											P								
11	**Side Vent / Drain and Mounting Bracket**	**Vent / Drain** / **Mounting Bracket**																			
		None / None												A							
		None / Yes (SST)												C							
		Side / None												D							
		Side / Yes (SST)												F							
12	**SST Parts**	**Housing** / **Cell Coating**																			
		Standard / None													Y						
		SS / None													C						
		Standard / Yes													M						
		SS / Yes													P						
13	**Special Treatment and Fill fluid**	**Treatment** / **Fill Fluid**																			
		None (Standard) / Silicone Oil														Y					
		Degreasing / Silicone Oil														G					
		Oxygen Service / Fluorinated Oil														A					
14	**Sensor O-Ring**	Viton																A			
		Teflon																B			
15	**Bolt / Nuts**	Standard (Cr-Mo Alloy, HexagonSocket Head Cap Screw / Carbon Steel Nut)																	A		
		Cr-Mo Alloy, Hexagon bolt / Nut																	B		
		NACE Bolt / Nut (ASTM A193 B7M / A194 2HM) [1]																	C		
		NACE Bolt / Nut (ASTM A320 L7M / A194 2HM) [1]																	D		
		304 SST / 304 SST [1, 2]																	E		
		630 SST / 304 SST [2]																	F		
16	**Special Options [3]**	Tropicalization [2]																			S
		With material Certificates																			A
		NACE Certification Cass III Bolting																			C
		NACE Certification c/w Class I MP35N Bolting																			N
		Special Option (Specify)																			X

Notes:

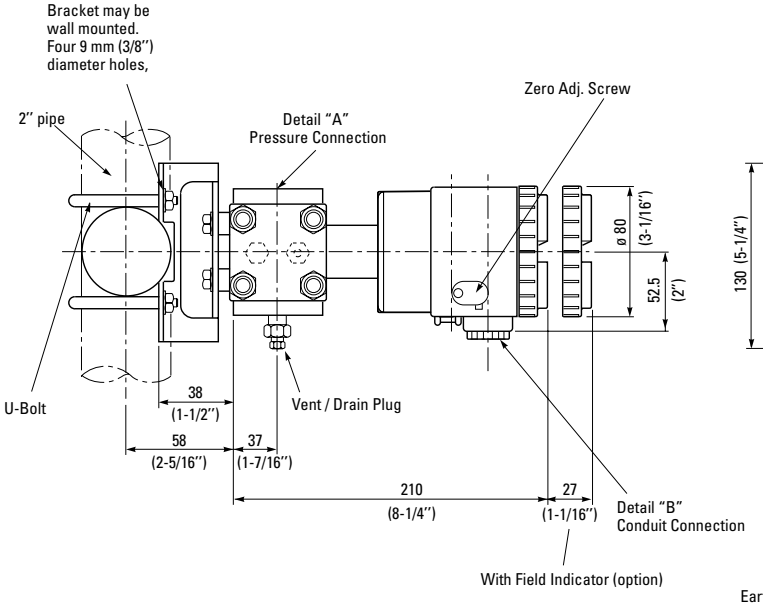
1 The static pressure of any transmitter with B7M, L7M or 304SS bolting must be limited to 1450 psi (+10MPa) max.

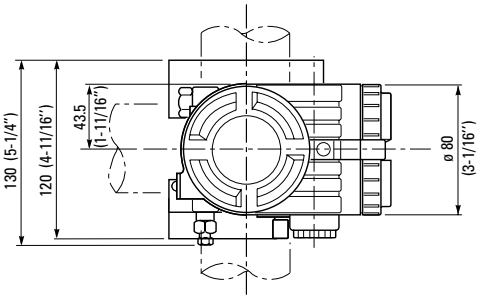
2 Specify SS bolts for all tropicalized service

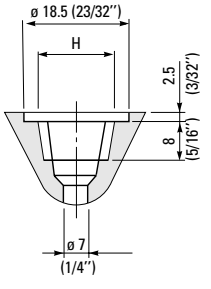
3 Specify this field only when necessary

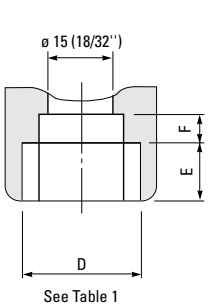
Outline Diagram

FCX-AIIe Differential Pressure Transmitter









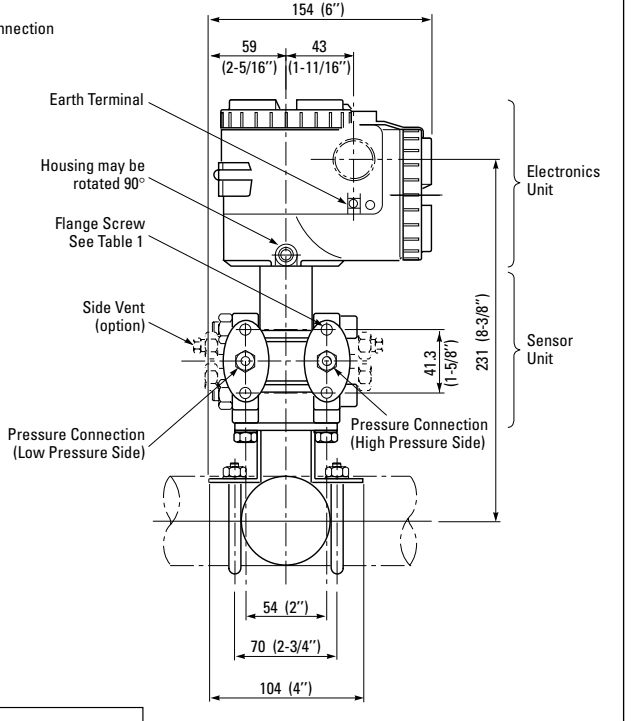
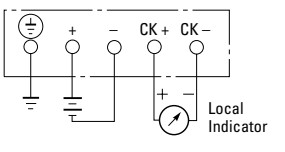


TABLE 1

4th Digit of the Code Symbols	Conduit Connection			Press. Conn.	Flange Screw
	D	E	F	H	
A	G 1/2	17 (21/32")	8 (5/16")	RC 1/4	7/16-20UNF Screw depth 15 (1/2")
C	1/2-14NPT	16 (5/8")	5 (3/16")	1/4-18NPT	7/16-20UNF Screw depth 15 (1/2")
D	Pg 13.5	8 (5/16")	4.5 (11/64")	1/4-18NPT	M10 Screw depth 15 (1/2")
E	M20 x 1.5	16 (5/8")	5 (3/16")	1/4-18NPT	M10 Screw depth 15 (1/2")
F	Pg 13.5	8 (5/16")	4.5 (11/64")	1/4-18NPT	7/16-20UNF Screw depth 15 (1/2")

CONNECTION DIAGRAM



These Barton products are represented in your area by:

Barton Instrument Systems designs, manufactures, sells and services precision instrumentation for the control and measurement of process variables including: pressure, level, flow, differential pressure, temperature and density. The technical and sales success of the FCX series of transmitters is the result of a long term strategic partnership between Barton and Fuji Electric. As the exclusive North American representative of Fuji transmitters, Barton is proud to offer this technically superior and cost competitive product line.

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